REMARKS/ARGUMENTS

In response to the Office Action of September 17, 2009, Applicants present the following amendments, arguments and evidence. The present amendments are requested solely for the purpose of more clearly describing and claiming the present invention and do not introduce any new matter. In addition, Applicants hereby petition for the minimum extension of time necessary such that the present submission is timely filed.

Applicants submit that in light of the arguments and evidence presented and amendments requested, this application is in condition for allowance. Accordingly, entry of these amendments, reconsideration of all pending rejections and objections, and passage to allowance is respectfully requested. With the entry of this amendment, claims 1-3, 6-7, 26, 28, 36-38 and 47- 55 and 58-63 are pending herein.

Amendments to the claims

Amendment of claim 1 is requested to more particularly point out and distinctly claim specific aspects of the present invention by providing a "a silicon nanofilm or one or more silicon nanoparticles, or a lithium alloy of said silicon nanofilm or said silicon nanoparticles, having a silicon oxide outer layer, wherein said nanofilm or nanoparticles are 18.5% to 50% SiO_2 by weight." Support for the amendment of claim 1 is provided throughout the specification, for example, in paragraph [0051] ("…nanostructured silicon material comprises up to about 70% or up to about 50% SiO_2 by weight"). The requested amendment of claim 1 does not introduce any new matter.

Amendment of claim 58 is requested to change "having" to recite "has." The requested amendment corrects an obvious typographical error and enhanced clarity. The requested amendment of claim 1 does not introduce any new matter.

Claims 55 and 56 are hereby cancelled in view of the requested amendment of claim 1. Applicants hereby reserve the right to pursue the invention of the rejected

claims in one or more continuation or divisional applications. Cancellation of claims 55 and 56 does not introduce any new matter.

Rejections under 35 U.S.C. § 102 and/or § 103

With entry of this Response, the present claims are amended to provide electrodes comprising a silicon nanofilm or nanoparticles, or lithium alloy thereof, having a silicon oxide outer layer. To emphasize this important aspect of the invention, the claims have been amended to provide an "electrode for a secondary electrochemical cell comprising a silicon nanofilm or one or more silicon nanoparticles, or a lithium alloy thereof of said silicon nanofilm or said silicon nanoparticles, having **a silicon oxide outer laye**r, wherein said nanofilm or nanoparticles is **18.5% to 50% SiO_2 by weight**."

Claims 1-3, 6, 7, 36, 38-43, 46, 48, 50, 54, 60 and 61 are rejected under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as obvious over Takamura (Abstract 257, 11th International Meeting on Lithium Batteries, 2002). Claims 26, 28, 44, 45, 49 and 53 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Takamura. Claims 37 and 47 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Takamura as applied to claim 1 and 26, in view of Park (U.S. 2002/0048705).

Applicants respectfully disagree with the characterization in the Office Action of the cited references and rejections under Sections 102 and 103. However, for the sole purpose of expediting passage to issuance, Applicants request amendments of the rejected claims, as described above. Accordingly, reconsideration and withdrawal of all pending rejections under 35 U.S.C. § 102 and 35 U.S.C § 103 is respectfully requested in light of the present amendments and the following arguments.

First, the cited references, Takamura and Park, taken alone or in combination, do not anticipate or render obvious the claims as amended with this response as these references do not disclose or teach a nanostructured silicon electrode having an outer

layer that is 18.5% to 50% SiO_2 by weight. In contrast to the characterization provided in the Office Action, for example, the Takamura et al. reference observes a lower than expected capacity, and merely speculates as to the presence of "inert SiO_2 formed by the presence of a residual formed by the presence of air in the vacuum chamber." Accordingly, the Takamura does not specify that the proposed SiO_2 component is provided as an **outer layer** of the electrode or quantify any amount of SiO_2, let alone indicate an electrode having a SiO_2 outer layer that is **18.5% to 50% SiO_2 by weight** as specified by the claims as amended with this response. Moreover, the Park reference does not disclose, or even contemplate, nanostructure silicon electrodes having a SiO_2 outer layer, let alone the specific weight percentage of SiO_2 of the amended claims. Therefore, Applicants assert that Takamura and Park do not anticipate or render obvious the rejected claims, as these references, taken alone or in combination, do not disclose or suggest all the limitations of the claims as amended herein [*See,* To Anticipate a Claim, the Reference Must Teach Every Element of the Claim, MPEP 2131; "A claim is anticipated only if each and every element as set forth in the claim is found," *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)]. Specifically, these references do not disclose, teach or suggest an electrode for an electrochemical cell comprising "a silicon nanofilm or one or more silicon nanoparticles, or a lithium alloy of said silicon nanofilm or said silicon nanoparticles, having a silicon oxide outer layer, wherein said nanofilm or nanoparticles are 18.5% to 50% SiO_2 by weight."

Second, Takamura and Park do not identify the SiO_2 weight percentage as a result-effective variable for enhancing electrode performance, and thus, these references are not fairly interpreted as rendering obvious the claimed range of SiO_2 weight percentage. As discussed above, Park does not disclose or even contemplate electrodes having a silicon oxide outer layer, let alone identify weight percentage of a SiO_2 outer layer as a result effective variable. On the other hand, Takamura suggests that the presence of SiO_2 contributed to a reduction in capacity of about 23% - 35% observed upon going from electrode dimensions of 400 Angstroms to 200 Angstroms

[2000 – 3000 mAh/g to 700 mAh/g, *See*, col. 2, lines 1-6], and therefore, the teaching in Takamura would not reasonably motivate or enable one of ordinary skill in the art to identify the SiO_2 weight percentage of their electrodes as a result-effective variable for enhancing electrode performance. Rather, this reference is fairly interpreted as teaching away from a nanostructured silicon electrode having 18.5% to 50% SiO_2 by weight because Takamura characterizes the SiO_2 as an **inert byproduct** having a negative affect on the capacity of their silicon films [*See* the last 2 lines of col. 1 to col. 2, lines 1-6]. As Takamura and Park do not identify either the presence or the amount of SiO_2 as a result effective variable, the disclosure in these references cannot render obvious the present claims limited to nanostructure silicon electrodes having a SiO_2 outer layer 18.5% to 50% by weight. [*See*, Only Result- Effective Variables Can Be Optimized, MPEP 2144.05(II)(B); "A particular parameter must be first recognized as a result-effective variable, i.e. a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation"; In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977)].

Finally, the SiO_2 weight percentage range of 18.5% to 50% of the claimed electrodes is a critical parameter providing unexpected performance benefits, which further support the patentability of the rejected claims. First, the **presence** of the silicon oxide outer layer is significant as it provides increased stability by contributing to the formation of a solid electrolyte interphase (SEI) layer, thereby preventing self discharge and formation of metallic lithium dendrites. [See Declaration Under 37 CFR 1.132 of Rachid Yazami submitted with the Amendment of June 23, 2009]. Second, the **specific weight percentage** of the silicon oxide outer layer of 18.5% to 50% is also an important parameter given the trade off between the beneficial performance attributes of the SiO_2 layer and the decrease in the capacity of the electrode resulting from incorporation of the outer layer. This position is directly supported by the Declaration by Rachid Yazami Under 37 CFR 1.132 submitted with this response which establishes that a SiO_2 weight percentage range of 18.5% to 50% achieves a practical and useful tradeoff of the

benefits provided by the SiO_2 layer and a limited reduction in electrode capacity. [See Declaration Under 37 CFR 1.132 of Rachid Yazami of March 17, 2010 submitted herewith]. Moreover, applicants believe that such performance benefits attributable to a SiO_2 outer layer having a weight percentage between18.5% to 50% were unrecognized by others at the time of the invention. The enhanced electronic properties directly attributable to the claimed range of SiO_2 weight percentage provide evidence of new and unexpected results relative to the prior electrodes described in Takamura and Park and, thus, support the patentability of the claims as amended with this response.

Therefore, in view of the deficiencies in Park and Takamura discussed above, and considering the general state of the art at the time of the invention, Applicants assert that the disclosure in these references, taken alone or in combination, do not anticipate or render obvious the claims as amended herein. Furthermore, the disclosure of these references would not enable one of ordinary skill in the art to arrive at the invention as claimed. Accordingly, Applicants assert that Park and Takamura, taken individually or in combination, do not anticipate or render obvious the rejected claims, as these references do not disclose, teach or suggest an electrode comprising a silicon nanofilm, silicon nanoparticles or lithium alloy thereof "having a silicon oxide outer layer, wherein said nanofilm or said nanoparticles are composed of 18.5% to 50% SiO_2 by weight," as explicitly provided by claim 1 as amended with this response. Therefore, Applicants respectfully request reconsideration and withdrawal of the pending rejections under 35 U.S.C § 102(b) and § 103(a).

CONCLUSION

In view of the foregoing, this case is considered to be in condition for allowance and passage to issuance is respectfully requested. If new issues of patentability are raised, the Examiner is invited to call and arrange for an opportunity to discuss these issues via telephone interview.

It is believed that an extension of three months and a corresponding fee of $555.00 is required for this submission. Therefore, payment in the amount of $555.00 is being made via the EFS-Web system. If this amount is incorrect or if problems are encountered using the EFS-Web system, please deduct all appropriate fees required for this submission, and any extension of time required, from Deposit Account No. 07-1969.

Respectfully submitted,
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